DC Cardioversion

- AF & AFL safe $^{1,2}$ efficacious $^{3,4}$ (60-94%) $^{5}$
- SR - Increases exercise tolerance $^{6}$
- Maintainence SR unlikely in patients in AF > 3 years duration $^{3}$
Indications – internal CV

- Failed external (on amiodarone)  
  
- High thoracic impedance (obesity & COPD)  
  
- Contra-indication to GA
Protocol

- Patients anticoagulated INR 2.0-3.0
- Normal electrolytes
- ECG recorded on admission
- Patient prepped as for femoral approach (usually)
- 8F sheath – femoral vein (or right internal jugular)
- Single pass electrode – placed in left Pulmonary artery
- Supplemental O2, pulse oximetry, non-invasive BP
- External defibrillation equipment available
Alert Catheter

- Temporary transvenous flow-directed multipurpose Atrial Defibrillation/Pacing device
- Designed temporary transmission of electrical impulses
  - Intra-cardiac Sensing
  - Intra-cardiac Pacing
  - Atrial Defibrillation (cardioversion)
ALERT Catheter

ALERT® (Atrial Low Energy Reversion Therapy) CATHETER
- 0.21 Guide wire, teflon coated
- Defibrillation Array – platinum
- Catheter marked 10 cm increments to allow depth of catheter in patient to be seen
Placement

- X-Ray
  - Venous access – patients right of spine
    - (on X-Ray – left of spine)
  - Balloon inflation – 2mls -RA level (air, check for leaks prior to insertion, flotation technique)
  - Check VE’s or arrhythmias during placement
  - Distal array – Pulmonary artery
  - RV electrode – within RV
  - Ra proximal array – within RA
Catheter placements

LPA

RPA

Bifurcation
Technical protocol

- Establish rhythm and record baseline
- Companion set up
  - Appropriate gains for IEGM
  - Rate limit to 360ms (fastest bpm allowed)
  - Energy level 15J. Discuss with operator to increase this level to 30J if 15J – fails
  - Tilt 50/50%*
  - Standby pacing – OFF*
Technical protocol

- Connect alert catheter
- Check I EGM
- Check synchronisation to R waves
  - Change sensitivity if unacceptable*
- Once patient is sedated
  - Check rhythm
  - Deliver Bi-atrial Shock
  - Confirm
- Check Rhythm
- 12 Lead ECG 1 hour post procedure
If attempt fails discuss options;

- increasing energy – max 30J
- Changing tilt 60/40%
- Changing catheter position
- IV flecainide (ERAF) \(^{10}\)
Tilt

- Percentage decay of the initial voltage
- Monophasic

Percentage decay of the initial voltage

Vi

50%

Vf

75%
Tilt Vi(2) = Vf(1)

- Biphasic

Vi(1)  Vf(1)

Vi(2)  Vf(2)

Pulse width 1 = Pulse width 2

50/50%

60/40%
Tilt = \frac{(V_i - V_f)}{V_i} \times 100 \%
Sensitivity

- Sensitivity level – allows sensing of R wave above a certain level
- relates to ventricular size recorded from Ventricular electrode
- Needed to synchronize to R wave
- 3 screens satisfactory sensing should be observed prior to shock delivery
- If sensing is not seen- increase sensitivity by lowering level
Sensitivity

A = NO SENSING
B – INTERMITTENT SENSING
C – STABLE SENSING
D – SENSING OF MUSCLE NOISE

MUSCLE

CARDIAC
ERAF

- EARLY RE-INITIATION of AF
  - PV ectopics $^{11}$
  - RA conduction variation $^{12}$
  - Atrial refractoriness (shorter in AF patients) $^{13}$
- Relapse AF within 1 minute after at least 2 sinus beats $^{14}$
- Incidence - 12% $^{14}$
ERAF - options

- **Flecainide**\(^\text{10}\) (normal LV function)
  - 100mg + 50mg over 10 mins
  - Impaired LVF – IV amiodarone 300mg IV bolus over 15 mins

- **Atrial pacing post shock**
  - Due to post shock bradycardia
  - To reduce atrial premature depolarisation – 42% success\(^\text{15}\) (500ms)
Asystole

- Emergency standby pacing
- ? Ensure ventricular capture – ring electrode
- external pacing facility – external defibrillator
Warnings

- Long QT syndrome
- LBBB
- CO2 for balloon inflation – presence of intracardiac shunts
Contra-Indications

- Peripheral embolism or stroke (last 3 months)
- Mechanical tricuspid/pulmonary valve
- Evidence of digitalis toxicity (failed to correct)
- Evidence of sepsis
- Evidence of hypercoagulation
Patient perception

- Effective and tolerable – fully conscious patients \(^{16}\)
- Low satisfaction – high in ICV group compared to ECV group 4 hours post procedure, but was lower 28 days post procedure \(^{17}\)
- Anxiety, depression, heart related symptoms
- Failure to maintain SR – most powerful contributor to low satisfaction
References

1. Internal low energy atrial cardioversion: efficacy and safety in older patients with chronic persistent AF – Boriani, G (2001)
3. AF recurrence after internal cardioversion: prognostic importance of electrophysiological parameters - Biffi, M (2002)
9. Role of prophylactic anticoagulation for DC cardioversion in patients with AF or AFL – Arnold, A (1992)
10. Favorable effects of flecaïnide intravenous internal cardioversion of AF – Boriani, G (1999)
17. Treatment satisfaction of internal versus external cardioversion in patients with chronic AF – a randomized, prospective, 28 day follow-up study